

Vehicle seat

BACKGROUND AND SUMMARY OF THE INVENTION

**[0001]** This application claims the priority of German patent document 10 2004 004 387.6, filed 29 January 2004 (PCT International Patent Application PCT/EP2005/000194), the disclosure of which is expressly incorporated by reference herein.

**[0002]** The invention relates to a vehicle seat.

**[0003]** In a vehicle seat such as is disclosed in German patent documents DE 101 63 049 A1, DE 101 63 050 A1, and DE 101 63 051 A1, an air duct with an air inlet opening arranged on the rear side of the head cushion (which side faces away from a seat occupant) and a hot air outlet opening arranged on the front side facing the seat occupant, are formed in the head cushion of the head restraint. The hot air device is integrated in the air duct and comprises an electric heating element and an axial fan which are arranged one behind the other in the air duct. Air sucked in by the axial fan via the air inlet opening on the rear side of the head cushion is guided over the heating element, and the hot air is blown out of the hot air outlet opening directly onto the neck and head region of the seat occupant, with hot air acting directly more on the neck and shoulder region or more on the neck and head region of the seated person, depending on the set height of the head restraint.

[0004] One object of the invention is to improve the hot air heating of the neck and head region of a seat occupant in such a manner that the sensation of coziness felt by seat occupants improved, even for those of differing body size.

[0005] This and other objects and advantages are achieved by the vehicle seat according to the invention, in which the hot air outlet opening is arranged on the lower side of the head cushion, and the intermediate space between head cushion and back rest to the rear is shielded. As a result, the back of the seated person's head is not directly subjected to hot air; rather, in the neck and head region of the seat occupant, a heat cushion is built up which also extends over the shoulder region. A heat cushion of this type imparts to the seat occupant a much greater sensation of warm coziness than is achieved when he or she is directly subjected to hot air, since there are no noticeable air streams or temperature strands in the heat cushion. This heat cushion is maintained even in the case of a height-variable head restraint which is set to accommodate the body size of a seat occupant, since the heat cushion is always built up in the intermediate space between head cushion and back rest, and the intermediate space always remains shielded to the rear, regardless of the setting of the head cushion.

[0006] In an advantageous embodiment of the invention, an air-guiding element is arranged in the intermediate space between head cushion and back rest, and is designed so that the hot air flowing out of the hot air outlet opening

is deflected toward the neck and head region of the seated person. In this case, the air-guiding element may either be formed separately and fastened to the upper side of the back rest, or formed integrally with the covering.

[0007] Other objects, advantages and novel features of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Figure 1 is a side view of a back rest and head restraint of a vehicle seat, with the head restraint and integrated hot air device illustrated in section;

[0009] Figure 2 is a perspective illustration of back rest and head restraint  
Figure 1;

[0010] Figure 3 is a rear view of back rest and head restraint with the hot air device according to a further representative embodiment;

[0011] Figure 4 is a side view of a vehicle seat, which is occupied by a seat occupant, with the back rest and head restraint (illustrated in longitudinal section) together with the hot air device according to a third representative embodiment;

[0012] Figure 5 shows a side view of back rest and partially cut away head restraint with integrated hot air device of a vehicle seat, according to a fourth representative embodiment; and

[0013] Figure 6 is a sectional, taken along the line VI – VI in Figure 5.

#### DETAILED DESCRIPTION OF THE DRAWINGS

[0014] The vehicle seat, part of which is illustrated in a side view in Figure 1 and in a perspective rear view in Figure 2, has, in addition to the seat cushion (not shown), a back rest 11, a height-adjustable head restraint 12 and a device (hereinafter called a “hot air device”) 13 for heating the neck and head region of a seat occupant 10 (Figure 4) with hot air. The head restraint 12 comprises in a known manner a U-shaped supporting hoop 14 with two parallel supporting rods 141, 142 (Figure 6) and a head cushion 15 which is fastened to a transverse part of the supporting hoop 14 that connects the two supporting rods 141. The supporting rods 141, 142 (of which only the supporting rod 141 can be seen in Figure 1) are guided in a known manner in the back rest 11 such that they can be displaced axially, so that the set height of the head restraint 12 (*i.e.*, the distance of the head cushion 15 from the upper side 111 of the back rest 11) can be changed in accordance with the size of the seat occupant 10.

[0015] An air-guiding duct 16 is formed in the head cushion 15 and has an air inlet opening 17 on the rear side 151 of the head cushion 15 (facing away

from the seat occupant 10) and a hot air outlet opening 18 arranged on the lower side 152 of the head cushion 15. Air inlet opening 15 and hot air outlet opening 18 are in each case closed by a grille 19 or 20, a “rosette”. The hot air device 13 is integrated in the air-guiding duct 16 and comprises an electric heating element 21 (for example, an electric heating coil) and an axial fan 22 which is preferably designed as a miniature fan. Heating element 21 and axial fan 22 are arranged one behind the other in the air flow direction, with it being possible for the axial fan 22 to be arranged upstream or downstream of the heating element 21.

**[0016]** As can be seen clearly in Figure 1, there is an intermediate space between the lower side 152 of the head cushion 15 and the upper side 111 of the back rest 11, the height of which varies depends on the height setting of the head restraint 12. This intermediate space is shielded to the rear, (that is, the side facing away from the seat occupant 10) by means of a covering 23 which extends on the rear side 151 or 112 of head restraint 12 and back rest 11 from the lower side 152 of the head cushion 15 as far as the upper side 111 of the back rest 11. The covering may also be guided laterally around the supporting rods 141, 142, as is illustrated in Figures 1 and 2. As a result, the covering 23 has a rear wall 231 which shields the intermediate space to the rear, and two side walls 232 and 233 (Figures 1, 2 and 6) which partially laterally cover the intermediate space. The rear wall 231 and the two side walls 232, 233 extend from the lower side 152 of the head cushion 15 as far as the upper side 111 of the back rest 11.

[0017] The covering 23 differs in design taking the height adjustability of the head restraint 12 into consideration:

[0018] In the embodiment of Figures 1 and 2, the covering 23 is an elastic curtain which is fixed in the manner described above to the head cushion 15 and to the back rest 11. During the height adjustment of the head restraint 12, the elastic curtain is stretched to a greater or lesser extent, so that the intermediate space between head cushion 15 and upper side 111 of the back rest 11 is always screened to the rear, and also partially laterally in the exemplary embodiment of figs. 1 and 2. An air-guiding element 24 which is fastened on the upper side 111 of the back rest 11 is arranged in the intermediate space, within the region enclosed by the covering 23. The air-guiding element 24, which is designed here as a wedge, is arranged so that the hot air flowing out of the hot air outlet opening 18 is deflected toward the neck and head region of the seat occupant 10.

[0019] In the embodiment of Figure 3, the covering 23 is designed as an apron 26 which, on the one hand, is fastened to the lower side 152 of the head cushion 15 and, on the other hand, is clamped on the rear side 112 of the back rest 11 by means of two elastic straps 27, 28. A cloth or a stiff plate can be used as the apron 26.

[0020] In the embodiment (part of which is illustrated in Figure 4) of a vehicle seat, the back rest 11 has a raised back rest end portion 29 which is an integral part of the back rest 11. The axial depth of the back rest end portion 29,

as seen in the longitudinal direction of the seat, is substantially smaller than the axial depth of the back rest 11. The width of the back rest end portion 29, as seen in the transverse direction of the seat, corresponds approximately to the width of the head cushion 15. The supporting hoop 14 in the back rest 11 is guided in the region of the back rest end portion 29.

**[0021]** The head cushion 15 is designed so that it overlaps the back rest end portion 29 on its front side facing the seat occupant 10, even when the height of the head restraint is set to the maximum. As a result, the intermediate space formed between the lower side 152 of the head cushion 15 and the upper side 111 of the back rest 11 is covered by the back rest end portion 29 which takes on the function of the covering 23 in Figs. 1-3. In other respects, the head restraint 12 with head cushion 15 and hot air device 13 integrated therein is designed identically to the head restraint 12 in Figure 1, and so identical structural elements are provided with the same reference numbers.

**[0022]** In a modification of the head cushion 15 in Figure 1, the head cushion 15 in Figure 4 is slightly angled on its lower side 152, so that the normal of the hot air outlet opening 18, which is situated in this angled portion, is set at an acute angle to the vertical and points in the direction of the shoulder region of the seated person. This setting of the normal of the hot air outlet opening 18 obtains the same effect as with the air-guiding element 24 in Figure 1.

**[0023]** In the embodiment of the vehicle seat (illustrated in Figure 5), the air-guiding element 24' for deflecting the hot air flowing out of the hot air outlet opening 18 to the head, neck and shoulder region of the seat occupant 10 is designed as a trough, rather than a wedge. It extends from the upper side 111 of the back rest 11, through the hot air outlet opening 18 and into the air-guiding duct 16. The vertical length of the air-guiding element 24' is selected such that, at maximum height setting of the head restraint 12, it still dips into the air-guiding duct 16. It is fastened on the upper side 111 of the back rest 11 by means of two fastening tabs 30, 31 which surround the supporting rods 141, 142 of the head restraint 12 with play.

**[0024]** The air-guiding element 24' at the same time takes on the function of the covering 23, with the trough base forming the rear wall 231 and the trough side walls forming the side walls 232 and 233 of the covering 23. That end of the trough-shaped air-guiding element 24' which projects into the air-guiding shaft 16 is open, so that the hot air already partially flows into the air-guiding element 24' and flows out via the trough opening, as it is arranged by air-guiding arrows in Figure 5. The other trough end which lies opposite the open trough end is closed by an end wall running obliquely from the trough base toward the trough opening. The air-guiding element 24' can be seen in cross section in Figure 6.

**[0025]** The foregoing disclosure has been set forth merely to illustrate the invention and is not intended to be limiting. Since modifications of the disclosed embodiments incorporating the spirit and substance of the invention may occur

to persons skilled in the art, the invention should be construed to include everything within the scope of the appended claims and equivalents thereof.